

Atty. Docket No. PIA31222/DBE/US  
Serial No: 10/751,199

**Amendments to the Drawings**

The attached sheet of drawings includes changes to Fig. 1. This sheet, which includes Figs. 1-2, replaces the original sheet including Figs. 1-2. In Fig. 1, the legend "Prior Art" is added as required by the Examiner.

Attachments: Replacement Sheet

Annotated Sheet Showing Changes

### **REMARKS/ARGUMENTS**

Applicant has carefully reviewed the Examiner's Office Action dated February 1, 2005, in which the Examiner objected to the drawings under MPEP 608.02(g); and rejected Claims 1 to 2 under 35 U.S.C. 102(e) as being anticipated by Ho et al. (U.S. 6,657,296).

#### **Amendments to the Drawings**

Fig. 1 has been amended to overcome the Examiner's objection to the drawings without adding any new matter and in full compliance with statutory and regulatory requirements.

#### **Amendments to the Claims**

Claim 1 has been amended to more particularly define the invention taking into consideration the outstanding Official Action.

#### **Rejection under 35 U.S.C. 102(e) by Ho et al. (U.S. 6,657,296)**

The rejection of Claims 1 and 2 under 35 U.S.C. 102(e) as being anticipated by Ho et al. has been carefully considered but is most respectfully traversed. In this regard, Applicant wishes to direct the Examiner's attention to MPEP §2131 which states that to anticipate a claim, the reference must teach every element of the claim.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). "The elements must be arranged as required by the claim, but this is not

an ipsissimis verbis test, i.e., identity of terminology is not required.” In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

The present invention, as defined in Claim 1, is directed to a method for packaging a semiconductor device, including the steps of forming a plurality of grooves on an upper surface of a substrate and attaching a heat sink on the upper surface of the substrate. An epoxy molding compound encapsulates and seals the substrate, which is attached to the substrate through the plurality of grooves.

The semiconductor device according to the present invention employs a plurality of grooves on the upper surface of the substrate. Because a groove has a shape generally resembling a long narrow channel, something having grooves thereon is generally not fully or completely penetrated. Accordingly, it is clear that, in the present invention, the substrate which has grooves formed thereon is not fully or completely penetrated. In addition, one function of the grooves is to enlarge the contact surface area between the substrate and the epoxy molding compound, to thereby improve the operational reliability of the semiconductor device.

Further, the invention of Claim 1 includes the step of attaching the heat sink on the upper surface of the substrate. Accordingly, it is clear that the heat sink is positioned on the upper surface of the substrate.

Applicant most respectfully submits that Ho et al. fails to disclose the step of forming a plurality of the grooves on the upper surface of the substrate. Ho et al. is directed to a semiconductor package which employs a plurality of thermal vias formed in a die-attach region, penetrating the substrate. Therefore, the thermal via does not correspond to the groove of the present invention. Further, thermal vias have a different function from the grooves of the present invention, because thermal vias are used to conduct heat generated by a chip therethrough.

Further, it is believed that Ho et al. does not disclose the step of attaching a heat sink on an upper surface of the substrate. Ho et al. disclose that a thermal pad is formed at the bottom side of the substrate. Even if one assumes that the thermal pad of Ho et al. is equivalent to the

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heat sink of the present invention, the attached position of the thermal pad on the substrate is believed to be different from that of the present invention.

It is also believed that Claim 2, which depends on Claim 1, is allowable for the same reasons indicated with respect to Claim 1, and further because of the additional feature recited therein which, when taken alone and/or in combination with the features recited in Claim 1, remove the invention defined therein further from the disclosure made in the cited reference.

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**CONCLUSION**

Applicant believes that this is a full and complete response to the Office Action. For the reasons discussed above, Applicant now respectfully believes that all of the pending claims are in condition for allowance. Accordingly, it is respectfully requested that the Examiner's rejections be withdrawn, and that Claims 1 and 2 be allowed in their present forms. If the Examiner feels that any remaining issues require discussion, he is kindly invited to contact Applicant's undersigned attorney to resolve the issues.

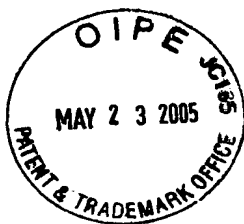
Respectfully submitted,

A handwritten signature in black ink, appearing to read 'AdD', with a stylized flourish at the end.

Andrew D. Fortney, Ph.D.  
Reg. No. 34,600

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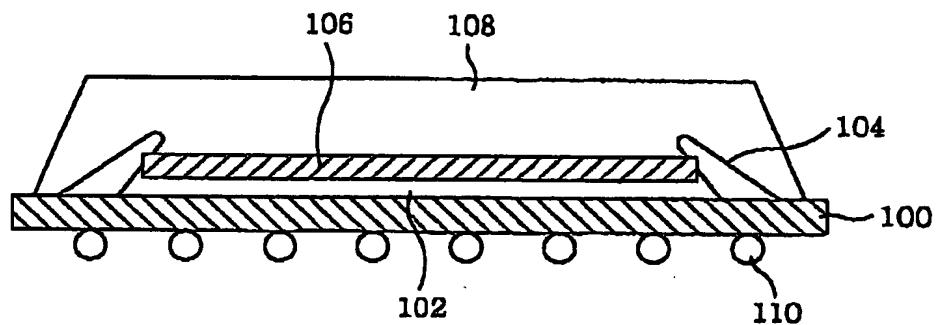
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## Annotated Sheet

**FIG. 1**

(PRIOR ART) — added



**FIG. 2**

